PRE-SERVICE PRESCHOOL AND PRIMARY SCHOOL TEACHERS' ATTITUDES ON ARTIFICIAL INTELLIGENCE: READINESS TO USE AND POTENTIAL CHALLENGES

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Abstract

The use of AI in the training of pre-service preschool and primary school teachers is a significant, but not sufficiently researched, issue. Although the application of AI in education is widely studied, specific studies related to preschool and primary education teacher preparation are rarer. The cognitive, emotional, and motor abilities of children up to 10-12 years require a special approach, so the integration of AI must be careful and methodologically sound.
The research aimed to analyse the readiness of pre-service preschool and primary school teachers to use artificial intelligence (AI) technologies in the educational process and to name the challenges they see. The research is based on qualitative methodology, and the nature of the research is informative-descriptive; interpretive/quantitative content analysis is applied. The data was collected in spring 2024 from 112 university students, using open-ended questions. The analysis revealed that 57.7 % of respondents feel insufficiently prepared to use AI, mainly due to lack of knowledge, practical skills, and technological mistrust. A third of the respondents show motivation to improve in this area, although real experience with AI is often limited to superficial use. In addition, a critical or cautious attitude toward AI emerged, regarding the concerns about the reliability, ethical implications, and the quality of learning. Challenges include educational (decreasing creativity and motivation), social and ethical (lack of communication, addiction), informational (inaccuracy, plagiarism), and technological aspects. Research results show the need to integrate the systematic development of AI competences into educational field studies, to strengthen the ethical and critical approach, and to create practical support measures to achieve a responsible and purposeful AI integration into both the study process and education in general.
Keywords: *artificial intelligence (AI), informative-descriptive study, pre-service preschool teachers, pre-service primary school teachers, qualitative research*

Introduction

It is obvious that artificial intelligence (AI) is changing teaching/learning processes, so it is necessary to understand whether pre-service teachers are ready to integrate AI into educational practice. Improving professional development and teaching practice becomes extremely important. AI tools enable beginning teachers to engage in self-directed professional development by reflecting on their own learning, exploring innovative methodologies, and using a wide variety of resources. This promotes continuous pedagogical development and the ability to adapt to the latest technologies based on AI (Kohnke et al., 2025). Tomaskinova and Tomask (2024) suggest that tailor-

https://doi.org/10.33225/BalticSTE/2025.133
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made workshops, continuing education, peer support, and ethical training are needed to enable teachers to effectively use artificial intelligence tools.

Research shows (Aljemely, 2024) that many teachers do not have enough technical knowledge and digital skills to understand and effectively use artificial intelligence tools, which makes it difficult to apply them in teaching practice. It goes without saying that effective artificial intelligence teaching programmes must be adapted to different subjects. Integration is hindered by the lack of personalised continuous training that includes both technical and ethical aspects (Arranz García et al., 2025).

Research on the pre-service teachers' position towards artificial intelligence (AI) is of particular importance as it allows us to identify their readiness, needs, and attitudes as regards this technology. This technology should become the basis for improving university study programmes, to ensure that teachers acquire sufficient artificial intelligence literacy and are able to effectively integrate it into the educational process.

Empirical studies reveal diverse pre-service teachers' attitude toward AI. For example, Bae et al. (2024)'s study, examining preschool education teachers' attitude towards generative artificial intelligence (GenAI) tools, showed that although some students were familiar with ChatGPT, only a small number of them intended to actively use this technology in their practice. Researchers related this to lingering uncertainty, which manifested itself in emotional responses, such as anxiety and worry (Bae et al., 2024).

Other studies confirm that students' opinions about AI benefits in education are ambivalent, ambiguous (Ice et al., 2008). Karataş and Yüce (2024) found that students positively evaluate AI's potential to personalise learning and improve learning quality. However, at the same time, they expressed clear concerns about potential threats to academic integrity and information reliability. Research also shows that students perceive AI-related feedback as requiring greater engagement but also acknowledge challenges that reflect ambiguous positions on the use of AI (Westmacott, 2017). These conflicting estimates reflect the complex perception of AI.

In recent years, the use of artificial intelligence (AI)- based teaching tools and educational platforms has significantly increased in educational institutions. It is especially important to study how these technologies are assimilated by pre-service preschool and primary education teachers, as their attitude and competencies will directly affect younger students' learning processes and achievements.

Empirical studies reveal that although students recognise the potential of AI in the education process, their opinions often express a balanced position. Many pre-service teachers emphasise that technologies should be seen as an educational tool, not as an educational element in itself.

A significant problem is that, although the number of studies on the application of AI in education is growing, specific work focusing on pre-service preschool and primary education teachers' attitudes is still underrepresented in scientific literature. This lack of research limits the possibility of fully understanding how the most important competencies of teachers are formed in the field of artificial technology application.

Thus, this study aimed to find out how pre-service preschool and primary education teachers feel prepared to use AI technologies for education in the future, and what possible/probable challenges they see.

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Research methodology

Design

A qualitative, informative-descriptive study was conducted. The study applied interpretive content analysis. It was appreciated that interpretive content analysis is a flexible method that does not limit itself to only visual content calculation. Such a technique involves coding text segments into subcategories and categories, focusing on hidden meanings and context (Drisko & Maschi, 2015). Analysing texts in the context of their use, content analysis differs from other research methods and is a highly productive research technique (Krippendorf, 2004). It is assumed that content analysis allows for the objective and systematic identification of specific characteristics of selected objects (Gao, 2009). This is part of a complex study, the quantitative analysis results of which were published earlier (Lamanauskas & Makarskaitė-Petkevičienė, 2025a). The study was conducted in March-April 2024 (during the spring semester).

Sample

The research sample consisted of university students in their first to fourth year of study, pre-service preschool and primary education teachers. All respondents were women. In this regard, possible differences between variables by gender are not analysed. A total of 112 Vilnius University students participated in the study, but the sample consisted of two structural divisions of the institution – the main division and the stem division, located in the northern region of Lithuania.

The study used a non-random, convenient sample. This sampling strategy was used because the population is relatively small, the study focuses only on university students of a defined profile, and the population itself is quite homogeneous. The researchers assessed the methodological point that if researchers carefully conduct the research using a convenience sampling technique and controlling biases and uncertainty, it produces useful data (Golzar et al., 2022). In addition, it can be especially useful for performing qualitative research, when detailed, nuanced data are desired. Convenience sampling, as a non-probability sampling, is quite often used in qualitative research and is a really popular sampling method (Hultsch et al., 2002; Zhao, 2020).

Instrument

The research applied open-ended questions. In the written survey, everybody was given the same questions. The researchers argue that this is useful because it aims to gain a deeper understanding of the respondents' opinions or to assess specific aspects. A series of open-ended questions were asked. This analysis presents the results based on two open-ended questions:

- Do you feel adequately prepared to use artificial intelligence technologies in your future teaching career?
- What potential challenges or shortcomings do you see in using AI in education?

https://doi.org/10.33225/BalticSTE/2025.133

In the two questions presented in the study, students were asked to describe and comment on their readiness to use AI technologies and possible (expected) challenges. These questions are a component of a complex research instrument (Lamanauskas & Makarskaitė-Petkevičienė, 2025a, 2025b). Some of the research results have been published previously according to other research aspects (Lamanauskas, 2024; 2025b).

Data analysis

A quantitative content analysis of the collected verbal data was performed using basic descriptive statistics. Absolute and relative frequencies were calculated and expressed as percentages. According to Taherdoost (2020), descriptive data analysis is recognized as the first type of data analysis.

Multiple readings of the extracted text array were performed. Meaningful units were identified – text segments that contain meaningful information. Several similar meaning units were combined into larger groups (subcategories). Later, semantically close subcategories were grouped into categories. This makes it possible to create a semantic structure that allows a clearer understanding of the phenomenon under study. The studied content categories were later evaluated quantitatively (George, 1959; Neuendorf, 2002). According to Shapiro and Markoff (1997), content analysis primarily means any systematic reduction of textual data to a standard and, at some level, statistically processed set of symbols.

Research Results

The respondents' position on the benefits of AI in education was analysed. Three categories were distinguished: *Insufficient readiness to use AI*, *Potential for improvement and motivation,* and *Critical/cautious attitude towards AI*. The results are presented in Table 1.

https://doi.org/10.33225/BalticSTE/2025.133

Table 1

Readiness to Use Artificial Intelligence Technologies

Category	*N* (%)	Subcategory	*N* (%)	Subcategory components	*N* (%)
Insufficient readiness to use AI	64 (57.7)	Lack of knowledge and skills	27 (24.4)	Lack of general knowledge about AI	14 (12.7)
				Do not feel ready	10 (9.0)
				Do not know how to apply AI in the educational process	3 (2.7)
		Lack of experience and practice	22 (19.8)	Lack of practical experience with AI tools	12 (10.8)
				Little attention was paid to AI during studies	4 (3.6)
				Have not yet had the opportunity to use AI in practice	6 (5.4)
		Technological distrust/unpreparedness	15 (13.5)	Do not have practical skills to use AI tools	6 (5.4)
				Used only ChatGPT or very superficially	4 (3.6)
				Afraid to use due to technological barriers/ misunderstanding	5 (4.5)
Potential to improve and motivation	34 (30.6)	Positive attitude and openness to innovations	21 (18.9)	Interested in AI and want to learn	8 (7.2)
				Visible benefits of AI (ideas, planning, teaching tools)	7 (6.3)
				Expect to acquire the necessary competencies during studies	6 (5.4)
		Need for improvement	13 (11.7)	Have basic knowledge, but it must be deepened	6 (5.4)
				Need more practice / deepen knowledge	5 (4.5)
				Use AI for personal needs, but not for education	2 (1.8)
Critical/ cautious attitude towards AI	13 (11.7)	Scepticism, priority for regular learning	13 (11.7)	Doubts about the reliability of AI/ quality of sources	4 (3.6)
				AI can be dangerous / limit the quality of education	3 (2.7)
				AI is not necessary; it is possible to teach without it	2 (1.8)
				Preference for traditional learning	2 (1.8)
				Refuse to use AI (indifference or hostility)	2 (1.8)

Note. 111 semantic units were identified

https://doi.org/10.33225/BalticSTE/2025.133

As can be seen in the first table, most respondents indicated that they currently felt insufficiently prepared to use AI (57.7%). Lack of knowledge and skills (24.4%) is the most frequently mentioned aspect. Lack of general knowledge about AI is evident (12.7%). In addition, several respondents admitted that they did not feel prepared (9.0 %) or did not know how to specifically apply AI in the educational process (2.7%). The subcategory Lack of experience and practice (19.8%) also has a fairly significant weight. It is emphasised that there is lack of practical experience with AI tools; insufficient attention was paid to the topic of AI during the studies, and some of the respondents still did not have an opportunity to try AI in practice.

Some respondents indicated that they did not have practical skills to use AI; they used it only superficially or felt fear due to technological barriers. On the other hand, a significant part of the respondents show openness and a desire to improve in the field of AI. Some respondents are actively interested in AI (7.2%), see its benefits (6.3%), or hope to acquire the necessary competencies during the studies (5.4%). The need for improvement is much less expressed. The respondents indicate that they have basic knowledge that needs to be deepened, or that more practice is needed. Some are already using AI for personal purposes, but not for education.

„I don't think I'm very prepared because I have a hard time understanding technology and it takes time to figure it out. I prefer books and contact learning" (A).

"My studies have helped me to discover different DI tools, I have had the chance to try out a few, and the only thing left to do is to practise using them" (B).

"I have not tried artificial intelligence technologies, or I am not even sure when artificial intelligence is used, as it is a rather broad term that covers a variety of technologies that are already common in our daily lives" (C).

"In my opinion, I will definitely use AI in my work, but at the moment I don't feel confident in my "ability" to use it properly and effectively, but if I could figure out how and in what ways AI could help me, then I wouldn't be opposed to using it in my job" (D)

A critical/cautious attitude towards AI is rather pronounced as well. Although this group is the smallest, it is still significant. Respondents express scepticism as regards AI. Scepticism and priority for conventional teaching/learning are also expressed. Doubts are usually indicated due to the reliability of AI, possible impact on the quality, or even a negative attitude ("AI is not necessary", 1.8%; "refuse to use", 1.8%).

In summary, it can be stated that more than half of the respondents feel insufficiently prepared to use AI, which is usually related to a lack of knowledge and practice, and technological distrust. However, a third shows motivation to improve, which is a positive prerequisite for change. A small but significant part maintains a cautious or even hostile attitude towards AI, which may be an obstacle to the widespread and effective application of these technologies in education. This allows us to state that it is necessary to strengthen the development of AI competencies both through formal education and through practical training and discussions about the possibilities and risks of AI application.

The position of the respondents on possible/likely challenges using AI in education was also analysed. Four categories were reasonably distinguished: *Pedagogical challenges and quality of education*, *Social, ethical, and psychological aspects*, *Information quality and sources, and Technological* and *infrastructural challenges*. The results are presented in Table 2.

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Table 2

Possible / Expected Challenges of Using AI in Education

Category	*N* (%)	Subcategory	*N* (%)	Subcategory components	*N* (%)
Pedagogical challenges and quality of education	46 (39.0)	Lack of creativity and critical thinking	17 (14.5)	Inhibition/lack of creativity	6 (5.2)
				Lack of critical thinking	3 (2.5)
				Students do not look for answers on their own	2 (1.7)
				Similar ideas	2 (1.7)
				Decreased imagination/effort	2 (1.7)
				Weakened thinking skills	2 (1.7)
		Deterioration of the teaching process	11 (9.3)	Decreased quality of learning	4 (3.4)
				Teachers no longer track progress	2 (1.7)
				Teachers cannot use AI purposefully	2 (1.7)
				Student skills development slows down	2 (1.7)
				Tasks become too simple	1 (0.8)
		A decrease in motivation and independence	10 (8.5)	Lack of independence	3 (2.5)
				Trust in AI instead of one's own strength	3 (2.5)
				Intrinsic motivation decreases	2 (1.8)
				AI "does everything for you"	2 (1.7)
		Lack of competences	8 (6.8)	Teachers lack AI competences	3 (2.5)
				Students do not know how to use AI properly	2 (1.8)
				It is not clear how AI works	2 (1.7)
				It is difficult to formulate queries	1 (0.8)
Social, ethical, and psychological aspects	32 (27.1)	Ethical violations and distrust	9 (7.6)	Ethical issues (privacy, authorship)	3 (2.5)
				Academic dishonesty	2 (1.7)
				Distrust between teachers and students	2 (1.7)
				Abuse of AI	2 (1.7)
		Lack of communication and human connection	9 (7.6)	Lack of live communication	4 (3.4)
				Loss of student-teacher connection	2 (1.7)
				Decreased human interaction	2 (1.7)
				Lack of group work	1 (0.8)
		Dependence and social exclusion	7 (5.9)	Dependence on technologies	4 (3.4)
				Use of AI reduces empathy	2 (1.7)
				AI changes human activity	1 (0.8)
		Psychological and physical consequences	7 (5.9)	More time in front of screens	2 (1.7)
				Physical fatigue (eyes, posture)	2 (1.7)
				Psychological tension/stress	2 (1.7)
				Fear of "imperfection" compared to AI	1 (0.8)

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Information quality and sources	26 (22.0)	Information inaccuracy and reliability	15 (12.8)	False/inaccurate information	6 (5.2)
				Unverified/incomplete sources	4 (3.4)
				Generalised/irrelevant information	3 (2.5)
				AI cannot answer specifically, provides abstractions	2 (1.7)
		Copyright, plagiarism, failure to cite sources	11 (9.3)	Plagiarism	3 (2.5)
				Uncited sources	3 (2.5)
				Inauthentic ideas	2 (1.8)
				Unclear authorship	2 (1.7)
				Copyright violations	1 (0.8)
Technological and infrastructure challenges	14 (11.9)	Technology availability and resources	6 (5.1)	Not all schools have the necessary technologies	3 (2.5)
				Not everyone has access to AI	2 (1.8)
				Internet connection problems	1 (0.8)
		AI performance limitations and restrictions	5 (4.2)	AI does not understand abstract queries	2 (1.8)
				AI cannot respond to emotions	1 (0.8)
				AI does not understand context	1 (0.8)
				AI answers are irrelevant	1 (0.8)
		High time costs when learning with AI	3 (2.5)	It takes time to understand AI	2 (1.7)
				Need to learn to use AI systematically	1 (0.8)

Note. 118 semantic units were identified

The second table shows that the category Pedagogical challenges and quality of education (39.0%) dominates the entire analysis and shows that the impact of AI on the learning process is of greatest concern. There is a noticeable suppression of creativity, similar ideas, a decrease in imagination and effort. Students often no longer try to think for themselves or look for solutions. The deterioration of the teaching process is also evident in the structure of challenges (9.3%). The use of AI in some cases contributes to the deterioration of the quality of learning because teachers are not always able to apply it purposefully, and the development of students' abilities may slow down. The decline in motivation and independence is less pronounced (8.5%). There is a growing reliance on AI instead of one's own strengths, a decrease in intrinsic motivation, and a lack of independence. In addition, both teachers and students often do not have sufficient competencies to use AI or even do not understand how it works.

"Excessive use of AI, less self-work, interaction with learning, and immersion" (E)

"It is possible to overstep the limit and automate too many things" (F)

"If not used properly, it can reduce motivation to study" (G)

"The emergence of a distrust factor between teacher and learner or between lecturer and student" (H).

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"Low-quality, inferior content applied/generated" (I)

"Ethical issues (privacy, copyright infringement)" (K)

"Weakening of independent thinking skills and creativity" (L)

Social, ethical, and psychological aspects occupy the second position (27.1%). This shows that the implementation of AI has not only technical or pedagogical, but also significant social consequences. For example, questions arise about privacy, authorship, possible misuse of AI, and academic dishonesty. Lack of communication and human connection (7.6%) is also expressed. It is believed that AI can reduce the possibilities of live communication, weaken the bond between teacher and student, and promote social exclusion. The growing dependence on technology also stands out as a significant challenge, which poses a threat to empathy and the comprehensiveness of human activity. Long-term use of AI can cause fatigue, stress, psychological strain, and distorted comparison with the "more perfect" AI system.

Information quality and sources (22.0%) is also a fairly significant category. The information provided in AI is not always reliable or properly cited. Incorrect, generalised, or unreliable answers pose challenges in checking facts and ensuring the quality of learning. AI increases the risk of plagiarism, as sources are often not provided, authorship is unclear, or inauthentic ideas are presented.

The least prominent category in the category structure is Technological and infrastructural challenges (11.9 %). Despite progress, the application of AI still faces practical barriers. Not all schools have the necessary equipment or internet connection, and not all students can use AI. It is noted that AI often does not understand emotions, context, abstract queries, and its answers may be irrelevant. Also, learning to work with AI requires time and systematic preparation.

The analysis shows that the integration of AI into the education process poses multiple challenges – from pedagogical to social and technological. The greatest risk arises due to possible weakening of thinking, creativity, and motivation, as well as due to growing dependence on AI and decreasing communication. In addition, challenges related to information reliability and copyright are observed. This indicates the need to integrate AI into the educational process in a balanced and responsible way, altogether strengthening the digital, ethical, and critical thinking competencies of teachers and students.

Discussion

The aim of the study was to analyse the readiness of pre-service preschool and pre-service primary education teachers to use AI technologies in the education process, as well as possible and likely challenges they see.

Students indicate that they lack knowledge, experience, or practical skills to use AI. On the other hand, students express a desire to delve deeper into studying AI, participate in trainings or seminars. At the same time, students doubt the benefits of AI, fear its impact on learning, or give priority to ordinary/conventional methods. Most students feel insufficiently prepared to use artificial intelligence (AI) technologies due to a lack of practice and knowledge. Almost a quarter are those who would like

https://doi.org/10.33225/BalticSTE/2025.133

to improve, but do not yet have sufficient skills. A small proportion of students are sceptical or cautious about AI. Although students have already tried AI for personal purposes, only a very small proportion feel fully prepared to apply it in the teaching process. It is important to note that even those who see the benefits of AI emphasise that its application requires critical evaluation and teacher competence. The study by García-Chitiva et al. (2024) also highlighted factors such as experience of using AI, coding skills, and perception of benefits of AI, which influence readiness. Researchers also found that the biggest concern was the potential decline in students' critical thinking and creativity, information reliability problems, and reduced social interaction. Wang and Chuang (2024) examined the factors influencing students' readiness to use artificial intelligence technology. They found that AI self-efficacy positively correlated with readiness, while anxiety about AI negatively affected readiness. Research shows that meeting psychological needs (autonomy, competence, relatedness) and employing self-regulated strategies, significantly increases AI literacy, which is a key component of readiness to learn (Wang et al., 2025). Furthermore, students are significantly more likely to use AI tools if they believe that these tools improve their academic achievement and learning outcomes (Hoang & Hoang, 2025; Tang et al., 2024; Wu et al., 2022).

The study revealed key challenges related to the use of artificial intelligence (AI) technologies (various platforms, tools, etc.) in education. The challenges identified include the weakening of critical thinking and creativity, information reliability problems (inaccurate answers, failure to cite sources), the weakening of social connections (reduced live communication, loss of teacher influence). The analysis also revealed technical and ethical difficulties (privacy security, dependence on technology, lack of teachers' and students' competences). Furthermore, the uneven availability of AI in schools and the risk that over-reliance on technology will reduce independent thinking and motivation to learn becomes obvious. These challenges require clear guidelines, training, and a balance between the use of AI and conventional educational methods. Despite its potential, the use of AI in education faces serious challenges. One of the biggest is teacher readiness. Many of them do not have enough knowledge and skills to integrate AI into the classroom, and the training offer is still limited. Teachers are also sceptical about automated grading systems because it is not entirely clear how these systems make decisions. Lack of transparency undermines trust in technologies. Similar results have been obtained by other researchers. Many beginning teachers report that they lack formal training in artificial intelligence tools and their integration, resulting in a lack of confidence and readiness to effectively use artificial intelligence in the educational process (Luckin et al., 2022; Zhu & Chen, 2022). Pre-service teachers express concern about data privacy, ethical use of artificial intelligence, and potential misuse of AI-generated content, highlighting the need for ethical guidelines and awareness in the field of AI education (Lamanauskas, 2025; Southworth et al., 2023; Williamson & Eynon, 2020). In addition, preschool and primary education teachers face difficulties in selecting appropriate AI programmes or educational activities that meet educational goals and curriculum requirements (Abualrob, 2025; Pursnani et al., 2023).

This study has several important limitations. First, the study was conducted with a small sample of subjects, and therefore, the obtained results and conclusions are not generalisable. Various demographic factors were also not assessed. The subjects were also students of a very specific field of study, namely, pre-service preschool and primary

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education teachers. Further studies should use a more diverse and larger sample to improve external validity.

Conclusions and Implications

A survey of pre-service preschool and pre-service primary education teachers showed that most students feel insufficiently prepared to use artificial intelligence (AI) technologies in the educational process. The greatest lack of preparation is determined by the lack of knowledge, practical skills, and real experience with AI. Students are often not familiar with the possibilities of applying AI in education, and during their studies, little attention is paid to this topic. However, some of the respondents show motivation to learn. They are interested in AI, hope to acquire the necessary competencies during their studies, and are already using some AI tools for personal purposes. However, only a very small proportion feel ready to apply AI in the educational process, and some students remain sceptical or even hostile regarding these technologies.

The study also revealed multiple challenges that teachers may face when integrating AI into education. The dominant challenge is educational: students fear that AI can inhibit students' creativity, critical thinking, reduce motivation, and promote passive learning. Social and ethical aspects are also prominent, as there are concerns about a lack of communication, privacy violations, technology addiction, and academic dishonesty. Another important challenge is the reliability of information: AI provides inaccurate, generalised information, often without citing sources, which poses a risk of plagiarism and disinformation. Technological barriers, such as insufficient equipment, internet accessibility, or AI limitations (inability to understand emotions or context), also hinder smooth integration.

These research results show that to effectively integrate AI into the educational process, it is necessary to strengthen students' AI competencies already during their studies. It is necessary to consistently include AI topics in teacher training programmes, organise practical training, and promote critical evaluation and discussions about the application of AI. It is especially important to form clear ethical guidelines and create support systems for pre-service teachers, from strengthening the technological base to pedagogical consulting. It is also necessary to find a balance between innovative AI solutions and conventional educational methods, so that AI is viewed as an auxiliary tool, and not as an end in itself.

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Received: *April 08, 2025* Accepted: *May 28, 2025*

Cite as: Lamanauskas, V. (2025). Pre-service preschool and primary school teachers' attitudes on artificial intelligence: Readiness to use and potential challenges. In. V. Lamanauskas (Ed.), *Science and technology education: Expectations and Experiences. Proceedings of the 6th International Baltic Symposium on Science and Technology Education (BalticSTE2025)* (pp. 133–145). Scientia Socialis Press. https://doi.org/10.33225/BalticSTE/2025.133